

WHAT IS CLAIMED IS:

1 1. In an image encoding method which comprises producing
2 a DC image composed of each block mean value by dividing an image
3 data per B pixel into a block, making a part of said DC image
4 a DC nest, and where the differential vector which is obtained
5 by separating the DC value from the pixel block to be encoded
6 is over an allowable value, calculating one or more orthogonal
7 basis, to which the differential vector is approximated, by the
8 adaptive orthogonal transform using the DC nest, the improvement
9 which comprises setting the lowest n ($n = \log_2 B$) bits of the
10 DC pixels in each sample to 0, where the base extraction blocks
11 are down-sampled from the DC nest and the block mean value thereof
12 is calculated using the samples.

1 2. The method according to Claim 1, wherein the lowest
2 n bits of each DC pixels are set to 0, where the DC nest is produced
3 from the DC image.

1 3. The method according to Claims 1 and 2, wherein a
2 base extraction vector is produced to which the differential
3 vector approximates by separating the block mean value from the
4 base extraction block in which n bits of the DC pixels are set
5 to 0.

1 4. The method according to Claim 3, optional elements
2 of base extraction vectors $\langle u_i \rangle$ are replaced by linear bond of
3 the remainder elements and the inner product of the base
4 extraction vectors and the other optional vectors $\langle w \rangle$ are
5 calculated by the formula.

$$\langle w \cdot u_i \rangle = (w_1 - w_{16}) u_1 + (w_2 - w_{16}) u_2 + \dots + (w_{15} - w_{16}) u_{15}$$

5. The method according to Claims 3 and 4, wherein a first basis is searched so that h_i may be maximum in the following formula,

$$h_i = \langle d \cdot u_i \rangle^2 / \|u_i\|^2$$

wherein $\langle d \rangle$ is the differential vectors and $\langle u_i \rangle$ is the base extraction vectors.

6. The method according to Claims 3 and 4, wherein a second basis is searched so that h_i may be maximum in the following formula,

$$h_i = \{ \langle d \cdot u_i \rangle - (\langle d \cdot u_1 \rangle \langle u_1 \cdot u_i \rangle / \|u_1\|^2)^2 / \{ \|u_i\|^2 - (\langle u_1 \cdot u_i \rangle) / \|u_1\|^2 \} \}$$

wherein $\langle d \rangle$ is the differential vectors, $\langle u_1 \rangle$ is the base extraction vectors corresponding to the first basis, and $\langle u_i \rangle$ is the base extraction vectors for searching the second basis.

7. The method according to Claims 3 and 4, wherein a third basis is searched so that h_i may be maximum in the following formula,

$$h_i = (\langle d \cdot u_i \rangle - \langle d \cdot v_1 \rangle \langle v_1 \cdot u_i \rangle - \langle d \cdot v_2 \rangle \langle v_2 \cdot u_i \rangle)^2 / \{ \|u_i\|^2 - \langle v_1 \cdot u_i \rangle^2 - \langle v_2 \cdot u_i \rangle^2 \}$$

wherein $\langle d \rangle$ is the differential vectors, $\langle v_1 \rangle$ is the first orthonormal base vectors, $\langle v_2 \rangle$ is the second orthonormal base vectors, and $\langle u_i \rangle$ is the base extraction vectors for searching the third basis.

1 8. The method according to Claims 6 and 7, wherein the
2 base extraction vectors $\langle u_i \rangle$ which match with search conditions
3 are subjected to orthonormal transform with one or more preceding
4 orthonormal basis.

1 9. In an image encoding method which comprises producing
2 a DC image composed of each block mean value by dividing an image
3 data per B pixel into a block, making a part of said DC image
4 a DC nest, and where the differential vector which is obtained
5 by separating the DC value from the pixel block to be encoded
6 is over an allowable value, calculating one or more orthogonal
7 basis, to which the differential vector is approximated, by the
8 adaptive orthogonal transform using the DC nest, the improvement
9 which comprises rearranging the norms of each scalar expansion
10 coefficient $\beta_1 \sim \beta_m$ in ascending or descending order, calculating
11 a difference (including 0) between the norms adjacent to each
12 other, and applying Huffman coding to the obtained difference,
13 wherein the basis is represented by $\beta_k \langle u_k \rangle$ ($k = 1 \sim m$).

1 10. In an image encoding method which comprises
2 producing a DC image composed of each block mean value by dividing
3 an image data per B pixel into a block, making a part of said
4 DC image a DC nest, and where the differential vector which is
5 obtained by separating the DC value from the pixel block to be
6 encoded is over an allowable value, calculating one or more
7 orthogonal basis, to which the differential vector is
8 approximated, by the adaptive orthogonal transform using the
9 DC nest, the improvement which comprises encoding an image data
10 of coding objective blocks instead of the coding of the basis,

11 where the basis is more than certain number.

1 11. In an image decoding method which comprises
2 reproducing a DC image corresponding to each block mean value
3 per B pixel from encoding data with respect to the HVQ system,
4 making a part of said DC image a DC nest, and reproducing image
5 data of target block by synthesizing, to DC value of target block,
6 one or more basis vectors which is selected from DC nests based
7 on the encoding data, the improvement which comprises setting
8 the lowest n ($n = \log_2 B$) bits of the DC pixels in each sample
9 to 0, where the selected block is down-sampled from the DC nest
10 and the block mean value of it is calculated using the samples.

1 12. In an image decoding method which comprises
2 reproducing a DC image corresponding to each block mean value
3 per B pixel from encoding data with respect to the HVQ system,
4 making a part of said DC image a DC nest, and reproducing image
5 data of target block by synthesizing, to DC value of target block,
6 one or more basis vectors which is selected from DC nests based
7 on the encoding data, the improvement which comprise, where the
8 decoded basis is information with respect to $\beta_k \langle u_k \rangle$ ($k = 1 \sim m$),
9 setting the lowest n ($n = \log_2 B$) bits of the DC pixels per each
10 selected block (U_k) read out from the DC nest to 0, calculating
11 a product-sum of basis $\beta_k \langle u_k \rangle$ ($k = 1 \sim m$), and then dividing the
12 calculated result by the block pixel number B.

1 13. The method according to Claims 11 and 12, wherein
2 the lowest n bits of each DC pixel is made 0, where DC nests
3 are produced from the DC image.

1 14. In an image encoding apparatus which comprises
2 producing a DC image composed of each block mean value by dividing
3 an image data per B pixel into a block, making a part of said
4 DC image a DC nest, and where a differential vector which is
5 obtained by separating the DC value from the pixel block to be
6 encoded is over an allowable value, calculating one or more
7 orthogonal basis, to which the differential vector is
8 approximated, by the adaptive orthogonal transform using the
9 DC nest, the improvement comprising a memory to store the DC
10 nest in which the lowest n ($n = \log_2 B$) bits of the DC nest pixels
11 are set to 0.

1 15. In an image decoding apparatus which comprises
2 reproducing a DC image corresponding to each block mean value
3 per B pixel from encoding data with respect to the HVQ system,
4 making a part of said DC image a DC nest, and reproducing image
5 data of target block by synthesizing, to the DC value of target
6 block, one or more basis vectors which is selected from DC nests
7 based on the encoding data, the improvement comprising a memory
8 to store the DC nest in which the lowest n ($n = \log_2 B$) bits
9 of the DC nest pixels are set to 0.

1 16. A computer readable recording medium storing a
2 program to make a computer to implement the processing according
3 to Claims 1 to 13.